

AMENDMENT TO THE CLAIMS

This Listing of Claims will replace all prior versions, listing, of claims in the specification.

LISTING OF CLAIMS:

Claims 1-13 (canceled).

Claim 14 (Previously presented) A method of packaging a photo-sensing device comprising the steps of:

- (a) establishing at least one photo-sensing die having at least integrated one photo-sensing area defined at a forward surface thereof for photo-electronically transducing light within a predetermined range of wavelengths;
- (b) forming on said photo-sensing die a plurality of first solder bumps electrically coupled to said photo-sensing area;
- (c) establishing at least one unit substrate formed of a material substantially transparent to light within said predetermined range of wavelengths;
- (d) forming at least one metal layer on said unit substrate about a front surface region thereof,

(e) configuring said metal layer to define a plurality of first and second solder bump pads and a plurality of interconnection lines each extending between at least one first solder bump pad and at least one said second solder bump pad;

(f) forming at least one passivation layer to extend over said metal layer;

(g) configuring said passivation layer to define a plurality of first and second access openings aligned respectively with said first and second solder bump pads;

(h) placing said photo-sensing die in inverted manner over said unit substrate, said first solder bumps each engaging one said first access opening of said passivation layer to contact one said first solder bump pad, said photo-sensing area of said photo-sensing die being thereby guided into alignment with said front surface region of said unit substrate; and,

(i) heating said first solder bumps to a characteristic reflow temperature thereof for attachment to said first solder bump pads of said unit substrate.

Claim 15 (Original) The method of packaging a photo-sensing device as recited in Claim 14 further comprising the step of attaching a

plurality of second solder bumps respectively to said second solder bump pads through said second access openings.

Claim 16 (Original) The method of packaging a photo-sensing device as recited in Claim 14 further comprising after step (g) the step of forming a dust-seal layer about said front surface region of said unit substrate.

Claim 17 (Original) The method of packaging a photo-sensing device as recited in Claim 15 further comprising the steps of pre-forming said first and second solder bumps with solder ball configurations, said second solder bumps being greater in a diametric dimension than said first solder bumps.

Claim 18 (Original) The method of packaging a photo-sensing device as recited in Claim 14 further comprising the step of forming an upper metal layer at least partially on said passivation layer, said upper metal layer being configured to extend at least partially over said first and second access openings to contact said first and second solder bump pads.

Claim 19 (Previously presented) The method of packaging a photo-sensing device as recited in Claim 14 wherein a plurality of said unit substrates are integrally defined on a substrate, said substrate being diced after step (i) for separation of said unit substrates one from the other.

Claim 20 (Previously presented) The method of packaging a photo-sensing device as recited in Claim 14 wherein a plurality of said photo-sensing dice are integrally defined on a wafer, said wafer being diced before step (h) for separation of said photo-sensing dice one from the other.

Claim 21 (Original) The method of packaging a photo-sensing device as recited in Claim 20 wherein a pick-and-flip-and-place operation is sequentially executed to place said photo-sensing dice respectively over corresponding ones of said unit substrates.

Claim 22 (Previously presented) A method of packaging a photo-sensing semiconductor device comprising the steps of:

(a) establishing at least one semiconductor die having at least integrated one photo-sensing area defined at a forward surface thereof for photo-electronically transducing light within a predetermined range of wavelengths;

- (b) forming on said semiconductor die a plurality of solder bump pads to be electrically coupled to said photo-sensing area;
- (c) attaching a plurality of first solder bumps respectively to said solder bump pads formed on said semiconductor die;
- (d) establishing at least one unit substrate formed of a material substantially transparent to light within said predetermined range of wavelengths;
- (e) applying at least a first metal layer on said unit substrate about a front surface region thereof;
- (f) selectively removing portions of said first metal layer to define a plurality of first and second solder bump pads and a plurality of interconnection lines each extending between at least one first solder bump pad and at least one said second solder bump pad;
- (g) forming at least one passivation layer to extend over said first metal layer;
- (h) selectively removing portions of said passivation layer to define a plurality of first and second access openings aligned respectively with said first and second solder bump pads;
- (i) placing said semiconductor die in inverted manner over said unit substrate, said first solder bumps each engaging one said first access opening of said passivation layer to contact one said first solder bump

pad, said photo-sensing area of said semiconductor die being thereby  
guided into alignment with said front surface region of said unit  
substrate; and,

(j) heating said first solder bumps to a characteristic reflow temperature  
thereof for attachment to said first solder bump pads of said unit  
substrate.

Claim 23 (Original) The method of packaging a photo-sensing  
semiconductor device as recited in Claim 22 further comprising the step of  
attaching a plurality of second solder bumps respectively to said second  
solder bump pads through said second access openings.

Claim 24 (Original) The method of packaging a photo-sensing  
semiconductor device as recited in Claim 22 further comprising after step  
(h) the steps of applying a dust-sealing material over at least a portion of  
said passivation layer; and, selectively removing portions of said dust-  
sealing material to form a dust-seal layer about said front surface region of  
said unit substrate.

Claim 25 (Original) The method of packaging a photo-sensing  
semiconductor device as recited in Claim 22 wherein a plurality of said unit

substrates are integrally defined on a substrate, said substrate being diced after step (j) for separation of said unit substrates one from the other.

Claim 26 (Original) The method of packaging a photo-sensing semiconductor device as recited in Claim 22 wherein a plurality of said semiconductor dice are integrally defined on a wafer, said wafer being diced before step (i) for separation of said semiconductor dice one from the other.

Claim 27 (Original) The method of packaging a photo-sensing semiconductor device as recited in Claim 26 wherein a pick-and-flip-and-place operation is sequentially executed to place said semiconductor dice respectively over corresponding ones of said unit substrates.

Claim 28 (Original) The method of packaging a photo-sensing semiconductor device as recited in Claim 22 further comprising before steps (c) and (i) the steps of applying a solder flux material respectively to said solder bump pads of said semiconductor die and said first solder bump pads of said unit substrate.

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Claim 29 (Original) The method of packaging a photo-sensing semiconductor device as recited in Claim 22 further comprising the step of forming a second metal layer at least partially on said passivation layer, said second metal layer being patterned to extend at least partially over said first and second access openings to contact said first and second solder bump pads.